We claim:

1. A microfluidic device comprising:

a substrate; and

a plurality of microvolumes at least partially defined by the substrate, each microvolume comprising a first submicrovolume and a second submicrovolume that is in fluid communication with the first submicrovolume when the device is rotated, the plurality of microvolumes being arranged in the device such that fluid in the first submicrovolumes of multiple of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

2. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes are transported to the second submicrovolumes when the device is rotated so that a force of at least 0.01 g is applied to fluid in the first submicrovolumes.

3. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes are transported to the second submicrovolumes when the device is rotated so that a force of at least 0.1 g is applied to fluid in the first submicrovolumes.

4. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes are transported to the second submicrovolumes when the device is rotated so that a force of at least 1 g is applied to fluid in the first submicrovolume.

5. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes are transported to the second submicrovolumes when the device is rotated so that a force of at least 10 g is applied to fluid in the first submicrovolume.

6. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes are transported to the second submicrovolumes when the device

is rotated so that a force of at least 100 g is applied to fluid in the first submicrovolume.

7. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes is transported to the second submicrovolumes when the device is rotated at least 10 rpm.

8. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes is transported to the second submicrovolumes when the device is rotated at least 50 rpm.

9. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes is transported to the second submicrovolumes when the device is rotated at least 100 rpm.

10. A microfluidic device according to claim 1 wherein the second submicrovolumes are lumens having a cross sectional diameter of less than 2.5 mm.

11. A microfluidic device according to claim 1 wherein the second submicrovolumes are lumens having a cross sectional diameter of less than 1 mm.

12. A microfluidic device according to claim 1 wherein the second submicrovolumes are lumens having a cross sectional diameter of less than 500 microns.

13. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 4 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

14. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 8 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

15. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 12 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

16. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 36 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

17. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 96 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

18. A microfluidic device according to claim 1 wherein fluid in the first submicrovolumes of at least 200 of the microvolumes are transported to second submicrovolumes of the associated microvolumes when the device is rotated.

19. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given microvolume upon rotation of the device is within 50% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

20. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given microvolume upon rotation of the device is within 25% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

21. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given microvolume upon rotation of the device is within 10% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

22. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given

microvolume upon rotation of the device is within 5% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

23. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given microvolume upon rotation of the device is within 2% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

24. A microfluidic device according to claim 1 wherein the volume of fluid delivered from the first submicrovolume to the second submicrovolume of a given sample microvolume upon rotation of the device is within 1% of the volume of fluid delivered from the first submicrovolumes to the second submicrovolumes of any other microvolumes when a same volume of fluid is added to the first submicrovolumes.

25. A microfluidic device according to claim 1, wherein the substrate comprises a member of the group consisting of polymethylmethacrylate, polycarbonate, polyethylene polypropylene, polystyrene, cellulose acetate, cellulose nitrate, polysulfones, styrene copolymers, glass, and fused silica.

26. A microfluidic device according to claim 1, wherein the substrate is optically transparent.

27. A microfluidic method comprising:

taking a microfluidic device comprising a substrate, and a plurality of microvolumes at least partially defined by the substrate, each microvolume comprising a first submicrovolume and a second submicrovolume where the first submicrovolume and second submicrovolume are in fluid communication with each other when the device is rotated;

adding fluid to a plurality of the first submicrovolumes; and

rotating the device to cause fluid from the plurality of first submicrovolumes to be transferred to the second submicrovolumes in fluid communication with the first submicrovolumes.

28. A microfluidic method according to claim 27 wherein at least 0.01 g is applied to fluid in the first submicrovolumes during rotation of the device to cause fluid from the first submicrovolumes to be transferred to the second submicrovolumes.

29. A microfluidic method according to claim 27 wherein at least 0.1 g is applied to fluid in the first submicrovolumes during rotation of the device to cause fluid from the first submicrovolumes to be transferred to the second submicrovolumes.

30. A microfluidic method according to claim 27 wherein at least 1 g is applied to fluid in the first submicrovolumes during rotation of the device to cause fluid from the first submicrovolumes to be transferred to the second submicrovolumes.

31. A microfluidic method according to claim 27 wherein at least 10 g is applied to fluid in the first submicrovolumes during rotation of the device to cause fluid from the first submicrovolumes to be transferred to the second submicrovolumes.

32. A microfluidic method according to claim 27 wherein at least 100 g is applied to fluid in the first submicrovolumes during rotation of the device to cause fluid from the first submicrovolumes to be transferred to the second submicrovolumes.

33. A microfluidic method according to claim 27 wherein the device is rotated at least 10 rpm.

34. A microfluidic method according to claim 27 wherein the device is rotated at least 50 rpm.

35. A microfluidic method according to claim 27 wherein the device is rotated at least 100 rpm.

36. A microfluidic method according to claim 27 wherein the second submicrovolumes have a cross sectional diameter of less than 2.5 mm.

37. A microfluidic method according to claim 27 wherein the second submicrovolumes are lumens having a cross sectional diameter of less than 1 mm.

38. A microfluidic method according to claim 27 wherein the second submicrovolumes are lumens having a cross sectional diameter of less than 500 microns.

39. A microfluidic method according to claim 27 wherein fluid is added to at least 4 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

40. A microfluidic method according to claim 27 wherein fluid is added to at least 8 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

41. A microfluidic method according to claim 27 wherein fluid is added to at least 12 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

42. A microfluidic method according to claim 27 wherein fluid is added to at least 24 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

43. A microfluidic method according to claim 27 wherein fluid is added to at least 96 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

44. A microfluidic method according to claim 27 wherein fluid is added to at least 200 different first submicrovolumes and transferred to the associated second submicrovolumes during rotation.

45. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given

microvolume upon rotation of the device is within 50% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

46. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given microvolume upon rotation of the device is within 25% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

47. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given microvolume upon rotation of the device is within 10% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

48. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given microvolume upon rotation of the device is within 5% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

49. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given microvolume upon rotation of the device is within 2% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

50. A microfluidic method according to claim 27 wherein the volume of fluid delivered from the first submicrovolume to the second microvolume of a given

microvolume upon rotation of the device is within 1% of the volume of fluid delivered from the first submicrovolumes to the second microvolumes of any other microvolumes when a same volume of fluid is added to the different first submicrovolumes.

51. A microfluidic method according to claim 27 wherein the method is performed as part of performing an array crystallization trial.

52. A microfluidic method according to claim 27 wherein the array crystallization trial involves the crystallization of a protein.

53. A microfluidic method according to claim 88 wherein the array crystallization trial involves the crystallization of a macromolecule with a molecular weight of at least 500 Daltons.

54. A microfluidic method according to claim 27 wherein the array crystallization trial involves the crystallization of a member selected from the group consisting of viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids

55. A microfluidic method according to claim 27 wherein the array crystallization trial involves the crystallization of more than one member selected from the group consisting of viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids, small molecules, inhibitors, substrates, drugs, putative drugs, inorganic compounds, metal salts, organometallic compounds and elements.

56. A microfluidic method comprising:

taking a plurality of microfluidic devices, each comprising a substrate, and a plurality of microvolumes at least partially defined by the substrate, each sample microvolume comprising a first submicrovolume and a second submicrovolume where the first submicrovolume and second submicrovolume are in fluid communication with each other when the device is rotated;

adding fluid to a plurality of the first submicrovolumes in the plurality of microfluidic devices; and

rotating the plurality of microfluidic devices at the same time to cause fluid from the plurality of first submicrovolumes to be transferred to the second submicrovolumes in fluid communication with the first submicrovolumes.

57. A microfluidic method according to claim 56 wherein the plurality of microfluidic devices are stacked relative to each other during rotation.

58. A microfluidic method according to claim 56 wherein the plurality of microfluidic devices are positioned about a rotational axis about which the plurality of microfluidic devices are rotated.

59. A microfluidic method according to claim 58 wherein the rotational axis about which the plurality of microfluidic devices are rotated is positioned within the lateral footprints of the plurality of microfluidic devices.

60. A microfluidic method according to claim 58 wherein the rotational axis about which the plurality of microfluidic devices are rotated is positioned outside of the lateral footprints of the plurality of microfluidic devices.